CYTOGENETIC ANALYSIS OF CHERNOBYL CLEAN UP WORKERS DETERMINED BY CHROMOSOME PAINTING.

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The Chernobyl reactor accident in 1986 was the largest non-military single release of radioactivity in history. This disaster provided an opportunity to study low dose chronic (or sub-acute) ionizing radiation exposures to a large population. Soviet citizens were sent to the site of the accident to contain and clean up the radioactive contamination. Their exposure to radiation was intentionally kept low, in the range of 5 and 25 cGy for most individuals. To examine the biological effects of this exposure on these individuals, we are performing chromosome painting of metaphase lymphocytes to quantify the frequencies of stable aberrations (translocations and insertions). To date, we have analyzed samples from 290 subjects by painting chromosomes 1, 2 and 4 simultaneously and examining a minimum of 500 cell equivalents per subject. Age and smoking status are available at this time for 205 subjects, including 51 controls and 154 clean up workers. Our data indicate a highly significant difference in frequency of stable aberrations between controls and exposed workers ($p < 0.001$). This difference is explainable by invoking an average dose of radiation to the clean-up workers of 12 ± 4 cGy (mean $\pm$ S.E.) of radiation, in excellent agreement with the intended doses. A strong effect of age is also seen on the translocation frequencies among smokers ($p < 0.0001$). These observations generally agree with our published work on an American population. This work was performed in part under the auspices of the US DOE by LLNL under contract No. W-7405-ENG-48.